

SEQUENCE LISTING

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<120> SPHINGOSINE KINASE ENZYME

<130> PITSON=1

<140> US 09/959,897

<141> 2001-11-13

<150> PCT/AU00/00457

<151> 2000-05-12

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<151> 1999-05-13

<150> AU PQ 1504

<151> 1999-07-08

<160> 56

<170> PatentIn version 3.1

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Arg Gly Val Leu Pro Arg Pro Cys Arg Val Leu Val Leu Leu Asn Pro		
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cgc ggc ggc aag ggc aag gcc ttg cag ctc ttc cgg agt cac gtg cag		149
Arg Gly Gly Lys Gly Lys Ala Leu Gln Leu Phe Arg Ser His Val Gln		
25 30 35		
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Pro Leu Leu Ala Glu Ala Glu Ile Ser Phe Thr Leu Met Leu Thr Glu		
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Arg Arg Asn His Ala Arg Glu Leu Val Arg Ser Glu Glu Leu Gly Arg	
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Trp Asp Ala Leu Val Val Met Ser Gly Asp Gly Leu Met His Glu Val	
75 80 85	
gtg aac ggg ctc atg gag cgg cct gac tgg gag acc gcc atc cag aag	341
Val Asn Gly Leu Met Glu Arg Pro Asp Trp Glu Thr Ala Ile Gln Lys	
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Pro Leu Cys Ser Leu Pro Ala Gly Ser Gly Asn Ala Leu Ala Ala Ser	
105 110 115	
ttg aac cat tat gct ggc tat gag cag gtc acc aat gaa gac ctc ctg	437
Leu Asn His Tyr Ala Gly Tyr Glu Gln Val Thr Asn Glu Asp Leu Leu	
120 125 130 135	
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Thr Asn Cys Thr Leu Leu Leu Cys Arg Arg Leu Leu Ser Pro Met Asn	
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Leu Leu Ser Leu His Thr Ala Ser Gly Leu Arg Leu Phe Ser Val Leu	
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Ser Leu Ala Trp Gly Phe Ile Ala Asp Val Asp Leu Glu Ser Glu Lys	
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Tyr Arg Arg Leu Gly Glu Met Arg Phe Thr Leu Gly Thr Phe Leu Arg	
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Leu Ala Ala Leu Arg Thr Tyr Arg Gly Arg Leu Ala Tyr Leu Pro Val	
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Gly Arg Val Gly Ser Lys Thr Pro Ala Ser Pro Val Val Val Gln Gln	
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Gly Pro Val Asp Ala His Leu Val Pro Leu Glu Glu Pro Val Pro Ser	
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His Trp Thr Val Val Pro Asp Glu Asp Phe Val Leu Val Leu Ala Leu	
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Leu His Ser His Leu Gly Ser Glu Met Phe Ala Ala Pro Met Gly Arg	
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Cys Ala Ala Gly Val Met His Leu Phe Tyr Val Arg Ala Gly Val Ser	
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 Arg Ala Met Leu Leu Arg Leu Phe Leu Ala Met Glu Lys Gly Arg His
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 Met Glu Tyr Glu Cys Pro Tyr Leu Val Tyr Val Pro Val Val Ala Phe
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 Trp Met Val Ser Gly Cys Val Glu Pro Pro Pro Ser Trp Lys Pro Gln
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Val Leu Val Leu Leu Asn Pro Arg Gly Gly Lys Gly Lys Ala Leu Gln
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Leu Phe Arg Ser His Val Gln Pro Leu Leu Ala Glu Ala Glu Ile Ser
 35 40 45

Phe Thr Leu Met Leu Thr Glu Arg Arg Asn His Ala Arg Glu Leu Val
 50 55 60

Arg Ser Glu Glu Leu Gly Arg Trp Asp Ala Leu Val Val Met Ser Gly
 65 70 75 80

Asp Gly Leu Met His Glu Val Val Asn Gly Leu Met Glu Arg Pro Asp
 85 90 95

Trp Glu Thr Ala Ile Gln Lys Pro Leu Cys Ser Leu Pro Ala Gly Ser

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Gly Asn Ala Leu Ala Ala Ser Leu Asn His Tyr Ala Gly Tyr Glu Gln 115 120 125		
Val Thr Asn Glu Asp Leu Leu Thr Asn Cys Thr Leu Leu Leu Cys Arg 130 135 140		
Arg Leu Leu Ser Pro Met Asn Leu Leu Ser Leu His Thr Ala Ser Gly 145 150 155 160		
Leu Arg Leu Phe Ser Val Leu Ser Leu Ala Trp Gly Phe Ile Ala Asp 165 170 175		
Val Asp Leu Glu Ser Glu Lys Tyr Arg Arg Leu Gly Glu Met Arg Phe 180 185 190		
Thr Leu Gly Thr Phe Leu Arg Leu Ala Ala Leu Arg Thr Tyr Arg Gly 195 200 205		
Arg Leu Ala Tyr Leu Pro Val Gly Arg Val Gly Ser Lys Thr Pro Ala 210 215 220		
Ser Pro Val Val Val Gln Gln Gly Pro Val Asp Ala His Leu Val Pro 225 230 235 240		
Leu Glu Glu Pro Val Pro Ser His Trp Thr Val Val Pro Asp Glu Asp 245 250 255		
Phe Val Leu Val Leu Ala Leu Leu His Ser His Leu Gly Ser Glu Met 260 265 270		
Phe Ala Ala Pro Met Gly Arg Cys Ala Ala Gly Val Met His Leu Phe 275 280 285		
Tyr Val Arg Ala Gly Val Ser Arg Ala Met Leu Leu Arg Leu Phe Leu 290 295 300		
Ala Met Glu Lys Gly Arg His Met Glu Tyr Glu Cys Pro Tyr Leu Val 305 310 315 320		
Tyr Val Pro Val Val Ala Phe Arg Leu Glu Pro Lys Asp Gly Lys Gly 325 330 335		

Met Phe Ala Val Asp Gly Glu Leu Met Val Ser Glu Ala Val Gln Gly
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Gln Val His Pro Asn Tyr Phe Trp Met Val Ser Gly Cys Val Glu Pro
 355 360 365

Pro Pro Ser Trp Lys Pro Gln Gln Met Pro Pro Pro Glu Glu Pro Leu
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Xaa	Xaa	Xaa	Xaa	Xaa	Phe	Ile	Leu	Val	Trp
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 <212> PRT
 <213> Mus musculus

<400> 9

Met Glu Pro Glu Cys Pro Arg Gly Leu Leu Pro Arg Pro Cys Arg Val
 1 5 10 15

Leu Val Leu Leu Asn Pro Gln Gly Gly Lys Gly Lys Ala Leu Gln Leu
 20 25 30

Phe Gln Ser Arg Val Gln Pro Phe Leu Glu Glu Ala Glu Ile Thr
 35 40 45

<210> 10
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 <213> Mus musculus

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Ser Gly Asn Ala Leu Ala Ala Ser Val Asn His Tyr Ala Gly Tyr Glu
 1 5 10 15

Gln Val Thr Asn Glu Asp Leu Leu Ile Asn Cys Thr Leu Leu Leu Cys
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Arg Arg Arg Leu Ser Pro Met Asn Leu Leu Ser Leu His Thr Ala Ser
 35 40 45

Gly Leu Arg Leu
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 <213> Mus musculus

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Ala Tyr Leu Pro Val Gly Thr Val Ala Ser Lys Arg Pro Ala Ser Thr
 1 5 10 15

Leu Val Gln Lys Gly Pro Val Asp Thr His Leu Val Leu Glu Glu Pro
 20 25 30

Val Pro Ser His Trp Thr Val Val Pro Glu Gln Asp Phe Val Leu Val
 35 40 45

Leu Val Leu Leu His Thr His Leu Ser Ser Glu Leu Phe Ala Ala Pro
 50 55 60

Met Gly Arg Cys Glu
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<210> 12
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<400> 12

Ala Gly Val Met His Leu Phe Tyr Val Arg Ala Gly Val Ser Arg Ala
 1 5 10 15

Ala Leu Leu Arg Leu Phe Leu Ala Met Gln Lys Gly Lys His Met Glu
 20 25 30

Leu Asp Cys Pro Tyr Leu Val His Val Pro Val Val Ala Phe Arg Leu
 35 40 45

Glu Pro Arg Ser Gln
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<210> 13
 <211> 63
 <212> PRT
 <213> Mus musculus

<400> 13

Phe Lys Leu Ile Leu Thr Glu Arg Lys Asn His Ala Arg Glu Leu Val
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Cys Ala Glu Glu Leu Gly His Trp Asp Ala Leu Ala Val Met Ser Gly
 20 25 30

Arg Gly Val Phe Ser Val Asp Gly Glu Leu Met Val Cys Glu Ala Val
1 5 10 15

Gln Gly Gln Val His Pro Asn Tyr Leu Trp Met Val Cys Gly Ser Arg
 20 25 30

Asp Ala Pro Ser Gly Arg Asp Ser Arg Arg Gly Pro Pro Pro Glu Glu
 35 40 45

Pro

<210> 17
 <211> 54
 <212> PRT
 <213> Mus musculus

<400> 17

Met Trp Trp Cys Cys Val Leu Phe Val Val Glu Cys Pro Arg Gly Leu
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Leu Pro Arg Pro Cys Arg Val Leu Val Leu Leu Asn Pro Gln Gly Gly
 20 25 30

Lys Gly Lys Ala Leu Gln Leu Phe Gln Ser Arg Val Gln Pro Phe Leu
 35 40 45

Glu Glu Ala Glu Ile Thr
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<210> 18
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 <213> Mus musculus

<400> 18

Ser Gly Asn Ala Leu Ala Ala Ser Val Asn His Tyr Ala Gly Tyr Glu
 1 5 10 15

Gln Val Thr Asn Glu Asp Leu Leu Ile Asn Cys Thr Leu Leu Leu Cys
 20 25 30

Arg Arg Arg Leu Ser Pro Met Asn Leu Leu Ser Leu His Thr Ala Ser
 35 40 45

Gly Leu Arg Leu
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 <213> Mus musculus

<400> 19

Ala Tyr Leu Pro Val Gly Thr Val Ala Ser Lys Arg Pro Ala Ser Thr
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Leu Val Gln Lys Gly Pro Val Asp
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<210> 20
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 <212> PRT
 <213> Mus musculus

<400> 20

Ala Gly Val Met His Leu Phe Tyr Val Arg Ala Gly Val Ser Arg Ala
 1 5 10 15

Ala Leu Leu Arg Leu Phe Leu Ala Met Gln Lys Gly Lys His Met Glu
 20 25 30

Leu Asp Cys Pro Tyr Leu Val His Val Pro Val Val Ala Phe Arg Leu
 35 40 45

Glu Pro Arg Ser Gln
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<210> 21
 <211> 63
 <212> PRT
 <213> Mus musculus

<400> 21

Phe Lys Leu Ile Leu Thr Glu Arg Lys Asn His Ala Arg Glu Leu Val
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Cys Ala Glu Glu Leu Gly His Trp Asp Ala Leu Ala Val Met Ser Gly
 20 25 30

Asp Gly Leu Met His Glu Val Val Asn Gly Leu Met Glu Arg Pro Asp
 35 40 45

Trp Glu Thr Ala Ile Gln Lys Pro Leu Cys Ser Leu Pro Gly Gly
 50 55 60

<210> 22
 <211> 47
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 <213> Mus musculus
 <400> 22

Tyr Ser Val Leu Ser Leu Ser Trp Gly Phe Val Ala Asp Val Asp Leu
 1 5 10 15

Glu Ser Glu Lys Tyr Arg Arg Leu Gly Glu Ile Arg Phe Thr Val Gly
 20 25 30

Thr Phe Phe Arg Leu Ala Ser Leu Arg Ile Tyr Gln Gly Gln Leu
 35 40 45

<210> 23
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 <213> Mus musculus
 <400> 23

Thr His Leu Val Pro Leu Glu Glu Pro Val Pro Ser His Trp Thr Val
 1 5 10 15

Val Pro Glu Gln Asp Phe Val Leu Val Leu Val Leu Leu His Thr His
 20 25 30

Leu Ser Ser Glu Leu Phe Ala Ala Pro Met Gly Arg Cys Glu
 35 40 45

<210> 24
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 <213> Mus musculus
 <400> 24

Arg Gly Val Phe Ser Val Asp Gly Glu Leu Met Val Cys Glu Ala Val
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Gln Gly Gln Val His Pro Asn Tyr Leu Trp Met Val Cys Gly Ser Arg
 20 25 30

Asp Ala Pro Ser Gly Arg Asp Ser Arg Arg Gly Pro Pro Pro Glu Glu

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Pro

<210> 25
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Asn Ser Lys Arg Asn Arg Ser Ile Leu Val Ile Ile Asn Pro His Gly
 20 25 30

Gly Lys Gly Thr Ala Lys Asn Leu Phe Leu Thr Lys Ala Arg Pro Ile
 35 40 45

Leu Val Glu Ser Gly Cys Lys
 50 55

<210> 26
 <211> 46
 <212> PRT
 <213> *Saccharomyces cerevisiae*

<400> 26

Ser Gly Asn Ala Met Ser Ile Ser Cys His Trp Thr Asn Asn Pro Ser
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Tyr Ala Ala Leu Cys Leu Val Lys Ser Ile Glu Thr Arg Ile Asp Leu
 20 25 30

Met Cys Cys Ser Gln Pro Ser Tyr Met Asn Glu Trp Pro Arg
 35 40 45

<210> 27
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 <212> PRT
 <213> *Saccharomyces cerevisiae*

<400> 27

Glu Asn Lys Asp Lys Asn Lys Gly Cys Leu Thr Phe Glu Pro Asn Pro
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Ser Pro Asn Ser Ser Pro Asp Leu Leu Ser Lys Asn Asn Ile Asn Asn
 20 25 30

Ser Thr Lys Asp Glu
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<210> 28
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 <212> PRT
 <213> *Saccharomyces cerevisiae*

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Asp Gly Thr Ile Asp Leu Val Ile Thr Asp Ala Arg Ile Pro Val Thr
 1 5 10 15

Arg Met Thr Pro Ile Leu Leu Ser Leu Asp Lys Gly Ser His Val Leu
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Glu Pro Glu Val Ile His Ser Lys Ile Leu Ala Tyr Lys Ile Ile Pro
 35 40 45

Lys Val Glu
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<210> 29
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 <212> PRT
 <213> *Saccharomyces cerevisiae*

<400> 29

Ile Glu Ile Ala Tyr Thr Lys Tyr Ala Arg His Ala Ile Asp Ile Ala
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Lys Asp Leu Asp Ile Ser Lys Tyr Asp Thr Ile Ala Cys Ala Ser Gly
 20 25 30

Asp Gly Ile Pro Tyr Glu Val Ile Asn Gly Leu Tyr Arg Arg Pro Asp
 35 40 45

Arg Val Asp Ala Phe Asn Lys Leu Ala Val Thr Gln Leu Pro Cys Gly
 50 55 60

<210> 30
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<212> PRT

<213> *Saccharomyces cerevisiae*

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Leu Ser Phe Leu Ser Gln Thr Tyr Gly Val Ile Ala Glu Ser Asp Ile
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Asn Thr Glu Phe Ile Arg Trp Met Gly Pro Val Arg Phe Asn Leu Gly
20 25 30

Val Ala Phe Asn Ile Ile Gln Gly Lys Lys Tyr Pro Cys Glu Val Phe
35 40 45

Val Lys Tyr Ala Ala Lys Ser Lys Lys Glu Leu Lys Val His Phe Leu
50 55 60

<210> 31

<211> 60

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<213> *Saccharomyces cerevisiae*

<400> 31

Leu Ser Pro Asn Phe Leu Asn Glu Asp Asn Phe Lys Leu Lys Tyr Pro
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Met Thr Glu Pro Val Pro Arg Asp Trp Glu Lys Met Asp Ser Glu Leu
20 25 30

Thr Asp Asn Leu Thr Ile Phe Tyr Thr Gly Lys Met Pro Tyr Ile Ala
35 40 45

Lys Asp Thr Lys Phe Phe Pro Ala Ala Leu Pro Ala
50 55 60

<210> 32

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<213> *Saccharomyces cerevisiae*

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Ser Gly Leu Phe Ser Val Asp Gly Glu Lys Phe Pro Leu Glu Pro Leu
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Gln Val Glu Ile Met Pro Met Leu Cys Lys Thr Leu Leu Arg Asn Gly
20 25 30

Arg Tyr Ile Asp Thr Glu Phe Glu Ser Met
35 40

<210> 33
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<212> PRT
<213> *Saccharomyces cerevisiae*

<400> 33

Asp Leu Val Glu Glu Ile Leu Lys Arg Ser Tyr Lys Asn Thr Arg Arg
1 5 10 15

Asn Lys Ser Ile Phe Val Ile Ile Asn Pro Phe Gly Gly Lys Gly Lys
20 25 30

Ala Lys Lys Leu Phe Met Thr Lys Ala Lys Pro Leu Leu Leu Ala Ser
35 40 45

Arg Cys Ser
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<210> 34
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<213> *Saccharomyces cerevisiae*

<400> 34

Ser Gly Asn Ala Met Ser Val Ser Cys His Trp Thr Asn Asn Pro Ser
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Tyr Ser Thr Leu Cys Leu Ile Lys Ser Ile Glu Thr Arg Ile Asp Leu
20 25 30

Met Cys Cys Ser Gln Pro Ser Tyr Ala Arg Glu His Pro Lys
35 40 45

<210> 35
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<212> PRT
<213> *Saccharomyces cerevisiae*

<400> 35

Glu His Lys Asn Lys Gly Ser Leu Glu Phe Gln His Ile Thr Met Asn
1 5 10 15

Lys Asp Asn Glu Asp Cys Asp Asn Tyr Asn Tyr Glu Asn Glu Tyr Glu
 20 25 30

Thr Glu Asn Glu Asp Glu Asp Glu Asp Ala Asp Ala Asp Asp Glu Asp
 35 40 45

Ser His Leu Ile Ser
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<210> 36
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 <212> PRT
 <213> *Saccharomyces cerevisiae*

<400> 36

Asp Gly Thr Met Asp Met Val Ile Thr Asp Ala Arg Thr Ser Leu Thr
 1 5 10 15

Arg Met Ala Pro Ile Leu Leu Gly Leu Asp Lys Gly Ser His Val Leu
 20 25 30

Gln Pro Glu Val Leu His Ser Lys Ile Leu Ala Tyr Lys Ile Ile Pro
 35 40 45

Lys Leu Gly
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<210> 37
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 <213> *Saccharomyces cerevisiae*

<400> 37

Ile Glu Val Val Tyr Thr Lys Tyr Pro Gly His Ala Ile Glu Ile Ala
 1 5 10 15

Arg Glu Met Asp Ile Asp Lys Tyr Asp Thr Ile Ala Cys Ala Ser Gly
 20 25 30

Asp Gly Ile Pro His Glu Val Ile Asn Gly Leu Tyr Gln Arg Pro Asp
 35 40 45

His Val Lys Ala Phe Asn Asn Ile Ala Ile Thr Glu Ile Pro Cys Gly
 50 55 60

<210> 38
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 <213> *Saccharomyces cerevisiae*

<400> 38

Leu Ser Phe Leu Ser Gln Thr Tyr Gly Leu Ile Ala Glu Thr Asp Ile
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Asn Thr Glu Phe Ile Arg Trp Met Gly Pro Ala Arg Phe Glu Leu Gly
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Val Ala Phe Asn Ile Ile Gln Lys Lys Lys Tyr Pro Cys Glu Ile Tyr
 35 40 45

Val Lys Tyr Ala Ala Lys Ser Lys Asn Glu Leu Lys Asn His Tyr Leu
 50 55 60

<210> 39
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 <212> PRT
 <213> *Saccharomyces cerevisiae*

<400> 39

Arg Asp Leu Ala Asp Ser Ser Ala Asp Gln Ile Lys Glu Glu Asp Phe
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Lys Ile Lys Tyr Pro Leu Asp Glu Gly Ile Pro Ser Asp Trp Glu Arg
 20 25 30

Leu Asp Pro Asn Ile Ser Asn Asn Leu Gly Ile Phe Tyr Thr Gly Lys
 35 40 45

Met Pro Tyr Val Ala Ala Asp Thr Lys Phe Phe Pro Ala Ala Leu Pro
 50 55 60

Ser
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<210> 40
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 <213> *Saccharomyces cerevisiae*

<400> 40

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 Arg Tyr Val Asp Thr Asp Phe Asp Ser Met
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 <213> Schizosaccharomyces pombe
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 Lys His Ile Trp Glu Ser Glu Ala Glu Pro Val Phe Ser Ser Ala His
 35 40 45
 Ser Ile
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 Met Thr Phe Glu Gln Lys Gly Lys Lys Ala
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<400> 43

Glu Lys Ser Lys Asn Leu Ala Pro Met Ser Glu Ser Ser Asp Ser Asp
 1 5 10 15

Lys

<210> 44

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<212> PRT

<213> Schizosaccharomyces pombe

<400> 44

Asp Gly Leu Ile Asp Val Val Ile Val Tyr Ser Lys Gln Phe Arg Lys
 1 5 10 15

Ser Leu Leu Ser Met Phe Thr Gln Leu Asp Asn Gly Gly Phe Tyr Tyr
 20 25 30

Ser Lys His Leu Asn Tyr Tyr Lys Val Arg Ser Phe Arg Phe Thr Pro
 35 40 45

Val Asn Thr
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<210> 45

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<212> PRT

<213> Schizosaccharomyces pombe

<400> 45

Cys Glu Val Val Leu Thr Arg Arg Lys Asp His Ala Lys Ser Ile Ala
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Lys Asn Leu Asp Val Gly Ser Tyr Asp Gly Ile Leu Ser Val Gly Gly
 20 25 30

Asp Gly Leu Phe His Glu Val Ile Asn Gly Leu Gly Glu Arg Asp Asp
 35 40 45

Tyr Leu Glu Ala Phe Lys Leu Pro Val Cys Met Ile Pro Gly Gly
 50 55 60

<210> 46

<211> 63

<212> PRT

<213> Schizosaccharomyces pombe

<400> 46

Tyr Ser Phe Leu Thr Ala Asn Tyr Gly Ile Ile Ala Asp Cys Asp Ile
1 5 10 15

Gly Thr Glu Asn Trp Arg Phe Met Gly Glu Asn Arg Ala Tyr Leu Gly
20 25 30

Phe Phe Leu Arg Leu Phe Gln Lys Pro Asp Trp Lys Cys Ser Ile Glu
35 40 45

Met Asp Val Val Ser Ser Asp Arg Thr Glu Ile Lys His Met Tyr
50 55 60

<210> 47

<211> 42

<212> PRT

<213> Schizosaccharomyces pombe

<400> 47

Thr Val Ser Thr Ser Pro Glu Ser His Leu Leu Thr Phe Glu Ile Asn
1 5 10 15

Asp Leu Ser Ile Phe Cys Ala Gly Leu Leu Pro Tyr Ile Ala Pro Asp
20 25 30

Ala Lys Met Phe Pro Ala Ala Ser Asn Asp
35 40

<210> 48

<211> 41

<212> PRT

<213> Schizosaccharomyces pombe

<400> 48

Gly Lys Arg His Tyr Phe Ala Leu Asp Gly Glu Ser Tyr Pro Leu Glu
1 5 10 15

Pro Phe Glu Cys Arg Val Ala Pro Lys Leu Gly Thr Thr Leu Ser Pro
20 25 30

Val Ala Gly Phe Gln Leu Leu Asp Ile
35 40

<210> 49
 <211> 55
 <212> PRT
 <213> *Caenorhabditis elegans*

<400> 49

Glu Asn Glu Gln Leu Thr Ser Val Ile Leu Ser Arg Lys Pro Pro Pro
 1 5 10 15

Gln Glu Gln Cys Arg Gly Asn Leu Leu Val Phe Ile Asn Pro Asn Ser
 20 25 30

Gly Thr Gly Lys Ser Leu Glu Thr Phe Ala Asn Thr Val Gly Pro Lys
 35 40 45

Leu Asp Lys Ser Leu Ile Arg
 50 55

<210> 50
 <211> 52
 <212> PRT
 <213> *Caenorhabditis elegans*

<400> 50

Ser Gly Asn Gly Leu Leu Cys Ser Val Leu Ser Lys Tyr Gly Thr Lys
 1 5 10 15

Met Asn Glu Lys Ser Val Met Glu Arg Ala Leu Glu Ile Ala Thr Ser
 20 25 30

Pro Thr Ala Lys Ala Glu Ser Val Ala Leu Tyr Ser Val Lys Thr Asp
 35 40 45

Asn Gln Ser Tyr
 50

<210> 51
 <211> 48
 <212> PRT
 <213> *Caenorhabditis elegans*

<400> 51

Thr Tyr Arg Pro Tyr Lys Pro Lys Gly Phe His Pro Ser Ser Asn Val
 1 5 10 15

Phe Ser Val Tyr Glu Lys Thr Thr Gln Gln Arg Ile Asp Asp Ser Lys
 20 25 30

Val Lys Thr Asn Gly Ser Val Ser Asp Ser Glu Glu Glu Thr Met Glu
 35 40 45

<210> 52
 <211> 53
 <212> PRT
 <213> *Caenorhabditis elegans*

<400> 52

Asp Asn Arg Ile His Leu Ser Tyr Ile Leu Trp Lys Asp Ile Gly Thr
 1 5 10 15

Arg Val Asn Ile Ala Lys Tyr Leu Leu Ala Ile Glu His Glu Thr His
 20 25 30

Leu Asp Leu Pro Phe Val Lys His Val Glu Val Ser Ser Met Lys Leu
 35 40 45

Glu Val Ile Ser Glu
 50

<210> 53
 <211> 65
 <212> PRT
 <213> *Caenorhabditis elegans*

<400> 53

Tyr Glu Val Val Val Thr Thr Gly Pro Asn His Ala Arg Asn Val Leu
 1 5 10 15

Met Thr Lys Ala Asp Leu Gly Lys Phe Asn Gly Val Leu Ile Leu Ser
 20 25 30

Gly Asp Gly Leu Val Phe Glu Ala Leu Asn Gly Ile Leu Cys Arg Glu
 35 40 45

Asp Ala Phe Arg Ile Phe Pro Thr Leu Pro Ile Gly Ile Val Pro Ser
 50 55 60

Gly
 65

<210> 54
 <211> 48
 <212> PRT
 <213> Caenorhabditis elegans

<400> 54

Ala Ser Phe Leu Ser Ile Gly Trp Gly Leu Met Ala Asp Ile Asp Ile
 1 5 10 15

Asp Ser Glu Lys Trp Arg Lys Ser Leu Gly His His Arg Phe Thr Val
 20 25 30

Met Gly Phe Ile Arg Ser Cys Asn Leu Arg Ser Tyr Lys Gly Arg Leu
 35 40 45

<210> 55
 <211> 56
 <212> PRT
 <213> Caenorhabditis elegans

<400> 55

Thr Lys Phe Gln Asn Trp Thr Leu Pro Asp Ser Asp Glu Thr Leu Ala
 1 5 10 15

Val Gly Ser Ser Asp Leu Glu Glu Thr Val Val Ile Glu Asp Asn Phe
 20 25 30

Val Asn Ile Tyr Ala Val Thr Leu Ser His Ile Ala Ala Asp Gly Pro
 35 40 45

Phe Ala Pro Ser Ala Lys Leu Glu
 50 55

<210> 56
 <211> 32
 <212> PRT
 <213> Caenorhabditis elegans

<400> 56

Gly Ser His Val Val Leu Asp Gly Glu Val Val Asp Thr Lys Thr Ile
 1 5 10 15

Glu Val Ala Ser Thr Lys Asn His Ile Ser Val Phe Ser Ser Thr Ala
 20 25 30